

WHAT IS CLAIMED IS:

- 1 1. A method of replacing an at least partially
- 2 spent first knife, which is locked in the knife holder
- 3 of a severing unit that is operative to sever smokers'
- 4 products, with a second knife, comprising the steps of:
- 5 automatically unlocking the first knife;
- 6 removing the first knife from the holder; and
- 7 introducing the second knife into the holder.

1 2. The method of claim 1, further comprising the
2 step of engaging the first knife prior to said removing
3 step, said removing step including advancing the first
4 knife along an at least substantially straight path and
5 further comprising the step of delivering the removed
6 first knife to and releasing the first knife at a
7 disposing station for spent knives.

1 3. The method of claim 2, wherein said engaging
2 step is carried out prior to said unlocking step.

1 4. The method of claim 2 of replacing a first
2 knife having a cutting edge, wherein said removing step
3 further includes grasping the cutting edge of the first
4 knife.

1 5. The method of claim 1, further comprising the
2 step of moving the first knife to a predetermined
3 position relative to the holder subsequent to said un-
4 locking step and prior to completion of said removing
5 step.

1 6. The method of claim 5, wherein said removing
2 step includes placing a withdrawing unit for the first
3 knife opposite the first knife not later than when the
4 first knife occupies said predetermined position.

1 7. The method of claim 1, further comprising the
2 step of interrupting the operation of the severing unit
3 at least in the course of said removing step.

1 8. The method of claim 7, further comprising the
2 step of maintaining the first knife at least close to
3 a predetermined position at the time of initiation of
4 said removing step.

1 9. The method of claim 8, wherein said removing
2 step includes placing a withdrawing unit for the first
3 knife opposite the first knife not later than when the
4 first knife occupies said predetermined position.

1 10. The method of claim 1 of replacing a first
2 knife which is subject to wear during operation of the
3 severing unit, further comprising the steps of monitoring
4 the extent of wear upon the first knife during operation
5 of the severing unit and initiating said removing step
6 when the wear upon the first knife reaches a predeter-
7 mined value.

1 11. The method of claim 1, further comprising the
2 step of automatically locking the second knife in the
3 holder upon completion of said introducing step.

1 12. The method of claim 1, further comprising the
2 steps of withdrawing the second knife from a storage
3 facility for second knives and conveying the thus with-
4 drawn second knife to a preselected position prior to
5 said introducing step.

1 13. The method of claim 12, wherein said conveying
2 step includes moving the second knife along an at least
3 partially linear path.

1 14. The method of claim 12, wherein said conveying
2 step includes moving the second knife along an at least
3 substantially linear path.

1 15. The method of claim 12, further comprising
2 the step of transporting the knife holder to a position
3 opposite said preselected position of the second knife
4 prior to said introducing step.

1 16. The method of claim 1, wherein the operation
2 of the severing unit includes moving the knife holder
3 and further comprising the step of interrupting the mov-
4 ing step preparatory to and in the course of said intro-
5 ducing step.

1 17. The method of claim 16, further comprising
2 the steps of withdrawing the second knife from a storage
3 facility, conveying the thus withdrawn second knife to
4 a preselected position prior to said introducing step,
5 and transporting the knife holder to a position opposite
6 the second knife in the preselected position of the se-
7 cond knife.

1 18. The method of claim 1, further comprising the
2 step of locking the second knife in the knife holder upon
3 completion of said introducing step.

1 19. The method of claim 1, further comprising the
2 step of maintaining, at the time of initiation of said
3 removing step, the knife holder at least close to a pre-
4 determined position in which the second knife can be
5 introduced into the knife holder upon completion of said
6 removing step.

1 20. The method of claim 1, further comprising the
2 step of automatically carrying out at least one of said
3 removing and introducing steps.

1 21. The method of claim 20, wherein said step of
2 automatically carrying out at least one of said removing
3 and introducing steps is computerized.

1 22. The method of claim 1, further comprising the
2 step of automatically locking the second knife in the
3 holder upon completion of said introducing step.

1 23. The method of claim 1, further comprising the
2 step of automatically carrying out at least one of
3 additional steps including:

4 engaging the first knife prior to said removing
5 step,

6 delivering the removed first knife to a disposing
7 station for first knives,

8 moving the first knife to a predetermined position
9 relative to the holder subsequent to said unlocking step
10 and prior to completion of said removing step,

11 interrupting the operation of the severing unit
12 at least in the course of said removing step,

13 maintaining the first knife at least close to a
14 predetermined position at the time of initiation of said
15 removing step,

16 monitoring the extent of wear upon the first knife
17 during operation of the severing unit,

18 initiating the removing step when the wear upon
19 the first knife reaches a predetermined value,

20 locking the second knife in the holder upon
21 completion of said introducing step,

22 withdrawing the second knife from a storage faci-
23 lity for second knives,

24 conveying the withdrawn second knife to a predeter-
25 mined position prior to said introducing step,

Claim 23, cont'd.

26 transporting the knife holder to a position oppo-
27 site a preselected position of the second knife prior
28 to said introducing step,
29 moving the knife holder during operation of the
30 severing unit,
31 interrupting the movement of the knife holder pre-
32 paratory to and in the course of said introducing step,
33 and
34 maintaining - at the time of initiation of said
35 removing step - the knife holder at least close to a
36 predetermined position in which the second knife can be
37 introduced into the knife holder upon completion of said
38 removing step.

1 24. /Apparatus for replacing a first knife, which
2 is locked in a knife holder of a severing unit in a
3 machine for severing partly finished smokers' products,
4 with a second knife, comprising:
5 disengageable means for locking the first knife
6 in the holder;
7 means for disengaging said locking means;
8 means for removing the first knife from the holder
9 upon disengagement of said locking means; and
10 means for introducing the second knife into the
11 holder upon removal of the first knife prior to reengage-
12 ment of the locking means.

1 25. The apparatus of claim 24, wherein said
2 locking means comprises a biasing member movable between
3 first and second positions in which a knife is respect-
4 ively locked in and removable from the holder, said
5 disengaging means comprising a displacing member and
6 means for moving said displacing member relative to the
7 holder to thus move said biasing member from said first
8 to said second position thereof at least during removal
9 of the first knife from the holder.

1 26. The apparatus of claim 25, wherein said
2 biasing member comprises at least one roller and said
3 displacing member comprises a reciprocable bolt.

1 27. The apparatus of claim 24, wherein said remov-
2 ing means includes means for clamping the first knife
3 at least during removal of the first knife from the hol-
4 der.

1 28. The apparatus of claim 24 for replacing a
2 first knife having a cutting edge, wherein said removing
3 means comprises means for clamping the cutting edge of
4 the first knife during removal of the first knife from
5 the holder.

1 29. The apparatus of claim 28, wherein said
2 removing means further comprises means for moving said
3 clamping means and the first knife along an at least
4 partially linear path extending away from the holder.

1 30. The apparatus of claim 24, further comprising
2 means for engaging said locking means upon introduction
3 of the second knife into the holder.

1 31. The apparatus of claim 30, wherein said engag-
2 ing means includes said disengaging means.

1 32. The apparatus of claim 24, wherein said
2 locking means comprises a biasing member movable between
3 first and second positions in which a knife is respect-
4 ively locked in and removable from the holder, and
5 further comprising means for moving the biasing member
6 between said positions and means for conveying the second
7 knife into the holder in the second position of said
8 biasing member and upon removal of the first knife from
9 the holder.

1 33. The apparatus of claim 32, further comprising
2 a storage facility for a supply of second knives, said
3 conveying means being arranged to move discrete second
4 knives seriatim from said storage facility to the holder.

1 34. The apparatus of claim 33, wherein said con-
2 veying means comprises driven rollers arranged to advance
3 second knives from said storage facility to the holder.

1 35. The apparatus of claim 33, wherein said storage fa-
2 cility comprises resilient means for biasing second
3 knives of the supply against each other.

1 36. The apparatus of claim 24, wherein said disen-
2 gaging means includes means for releasably locking a se-
3 cond knife in the holder upon introduction of such second
4 knife into the holder.

1 37. A method of removing a knife which is locked
2 in the knife holder of a severing unit that is operative
3 to sever smokers' products, comprising the steps of:
4 automatically unlocking the knife; and
5 removing the unlocked knife from the holder.

1 38. The method of claim 37, further comprising
2 the step of replacing the removed knife with a second
3 knife.

1 39. The method of claim 38, wherein at least one
2 of said removing and replacing steps includes advancing
3 the respective knife along an at least substantially li-
4 near path.

1 40. / A method of introducing a knife into the knife
2 holder of a severing unit which is operative to sever
3 smokers' products, comprising the steps of:
4 conveying the knife into the knife holder; and
5 automatically locking the conveyed knife in the
6 knife holder.

1 41. The method of claim 40, further comprising
2 the step of removing a spent knife from the holder prior
3 to said conveying step.

1 42. / Apparatus for withdrawing an at least
2 partially used and/or damaged knife which is lockingly
3 engaged by the knife holder of a machine for severing
4 partly finished smokers' products, comprising;
5 means for terminating the locking engagement
6 between the knife and the holder; and
7 means for removing the knife from the knife holder
8 upon termination of said locking engagement.

1 43. The apparatus of claim 42, further comprising
2 means for introducing a fresh knife into the knife holder
3 upon removal of the at least partially used and/or
4 damaged knife.

1 44. Apparatus for inserting a knife into the knife
2 holder of a machine for severing partly finished smokers'
3 products, comprising:
4 means for releasably locking knives in the holder;
5 means for disengaging said locking means; and
6 means for conveying discrete knives into the holder
7 in the disengaged condition of said locking means.

1 45. The apparatus of claim 44, further comprising
2 a source of knives, said conveying means being arranged
3 to transport discrete knives from said source to the
4 holder.

1 46. The apparatus of claim 44, wherein said
2 locking means includes means for clamping knives to the
3 holder.